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MAJOR ISSUES IN THE FIELD OF SHIPPING, PORTS AND INLAND WATERWAYS: LATEST SHIPPING TECHNOLOGIES AND THEIR IMPACT IN THE ESCAP REGION

(Item 5 (a) of the provisional agenda)

Note by the secretariat

INTRODUCTION

1. The most prominent characteristic in the shipping of the developing member countries of the Asian and Pacific region within the last two decades has been the extensive introduction of new shipping technology. This has been applied in various ways. With the introduction of modern ships some conventional methods were modernized and others were done away with and replaced by new techniques, while outdated vessels were put out of operation. The impact of these new shipping technologies on international and domestic trade, as well as on national economies, is likely to be substantial. With the introduction of modern telecommunication systems, the methods by which trade is carried out are changing. More significance is given to information flows between economic partners. The developments in containerization and other specialized technologies and the use of specialized new vessels fit into these changing patterns and result in higher efficiency in transport.

2. At the same time, the new shipping technologies developed in industrialized nations, when being adapted for use in the major trades of developing countries, present a multitude of new problems. The introduction of new sophisticated vessels, port terminals and handling equipment requires greater levels of skills and experience, not only in system and operational management, but also in shipboard management, safe navigation and the proper upkeep and maintenance of complicated and sophisticated fleet units and port handling facilities. Shipowners possess only a limited capacity or are unable to modernize or expand their fleets to take advantage of these new technologies. Efforts to co-operate in formulating a subregional shipping network and pooling of shipping resources are often inadequate. There are insufficient repair facilities capable of adequately catering to new technology vessels or equipment. Port facilities are inadequate and there is insufficient environmental protection of sea ports. The level of co-operation among shipowners, shippers, land transport operators and other parties concerned is insufficient to achieve optimum results from the new transport systems and technologies and to simplify documentation. Finally, there is inadequate co-operation between countries.

3. All this has created an urgent demand for highly trained nautical, technical, port operational, telecommunication and computer systems personnel to solve more rapidly the various problems encountered and to facilitate taking advantage of the changes brought about by modern shipping technology for the prosperity of national economies.

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I. GENERAL DEVELOPMENTS IN TRADE AND SHIPPING

4. The continued recession in the world economy finally showed signs of recovery in the developed countries at varying levels in 1983. Most developing countries, however, are still troubled by accumulated debts, price fluctuations for their export commodities and stagnating industrial development. Oil- and gas-producing countries suffered from a lack of purchasing power.

5. The total volume of international sea-borne traffic decreased, according to Fearnleys' statistics,[1/] by 8.4 per cent to 3,249 million tons in 1982 as compared with the previous year. Tanker cargoes were exposed to the most severe decline, 213 million tons, while dry cargo shipment declined by 73 million tons, predominantly in such commodities as iron ore, grain, coaking coal, bauxite and phosphate.

6. Fearnleys' estimates for 1983 show that the volume of world sea-borne trade reached some 3,165 million tons and although still down from 1982 the decrease is considerably less than anticipated and thereby indicates some recovery. Despite the continued recession this small but important improvement in world sea-borne trade gives hope for a stronger growth in years to come.

7. The developing countries in the region are major users of cargo shipping services. Their share in foreign sea-borne trade stands at approximately a quarter of global trade. They are the major producers and exporters of such primary commodities as jute, tropical timber and timber products, natural rubber and latex, coconut and related products, silk, tea, tapioca, pepper and other spices. These and other major commodities play a very important role in the economy of these countries as more than 75 per cent of their population are engaged in either the cultivation, processing, manufacture or transport of these goods. In terms of volume and of value the export of the primary commodities of these developing countries showed a better performance compared with other developing countries in the world. Their share constitutes a dominating role in world commodity exports.

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1/ Review 1983 (Oslo, Fearnleys, 1984), p. 24, table 1.

8. Most developing countries of the region achieved a relatively high average growth rate for exports of between 5 and 10 per cent per annum during the last decade. The major stimulus contributing to the exports of the developing nations is the recovery of the market prices of primary products which are firming up as a result of the recovery of the world economy. The export volumes of selected commodities for 1974 and 1983 are shown in table 1.

Table 1. Volumes of export trade of major commodities in the Asian and Pacific region

(Thousand tons)

Commodity	1974	1982
Agricultural and food materials		
Cereals[a/]	4 368	8 170
Sugar	2 741	3 790[b/]
Coffee	193	359[b/]
Tea	463	535[b/]
Spices	129	190[b/]
Natural rubber	2 879	2 948[b/]
Cotton	248	418[b/]
Vegetable oil	1 654	2 202[b/]
Fruits, fresh and dried	1 221	1 442[b/]
Fish, fresh and preserved	351	610[b/]
Tobacco	199	197[b/]
Jute and allied fibres	790	418[b/]
Wool	11	11[b/]
Raw hides and skins	26	20[b/]
Mineral and forestry products		
Iron ore	21 740	23 900[b/]
Copper concentrates	1 550	1 861
Wood and lumber	27 127	23 165[b/]
Coal	414	100[b/]
Manganese ore	1 444	612[b/]

Source: Statistical Yearbook for Asia and the Pacific, 1982 (United Nations publication, Sales No. E/F.84.II.F.8), p. 12.

Notes: a/ Comprising maize, rice and products.

b/ Provisional.

9. The rapid expansion of the international sea-borne trade of the developing ESCAP countries covers more than the limited number of commodity exports mentioned in table 1. It has affected a much wider range of commodities both in import and export shipping. Over the same period, thanks to industrialization, a sizeable volume of agricultural and forestry produce is processed into semi-manufactured or to end-products. This imposes further changes upon transport facilities. As a result, trade expansion in these countries over the last two decades has been accompanied by far-reaching changes in shipping and cargo-handling techniques.

10. Most of the exports and imports of ESCAP member countries are carried by sea. Even for land-locked countries such as Afghanistan, Bhutan, Lao People's Democratic Republic, Mongolia and Nepal, many vital commodities require a sea-going stretch in their transport links.

11. China, which had only a limited number of seagoing cargo ships in the early 1960s, now operates a fleet which can carry over 70 per cent of its sea-borne trade on the general cargo shipping routes to the United States of America, Japan, South-East Asia, West Africa, Europe and Oceania. In 1982, the export trade of China totalled $US 22.4 billion and imports amounted to $US 16.1 billion, of which over 90 per cent was water-borne.

12. The expansion of India's international trade is a continuous process. The country's total trade value increased from Rs. 114.3 million in 1977/78 to Rs. 231.9 million in 1982/83 of which only 0.5 per cent is transported by rail, road and/or inland waterways. The volume of the export and import trade carried by Indian flag vessels during the last seven years was over 24.0 million tons annually.

13. Japan relies on overseas supplies for more than 90 per cent of its needs. In 1983, its 83 million tons of exports and 547 million tons of imports account for 20 per cent of the world's sea-borne cargo traffic or 25 per cent on a ton-mile basis.

14. The economy of Thailand depends almost entirely upon the export of natural raw materials, maize, rice, teak, tapioca, rubber, silk and tin and other products to be processed and manufactured by industries in the developed countries of Europe, the United States and Japan. However, in recent years Thailand has been successfully developing overseas markets for textiles, manufactured and finished agricultural products, clothes, footwear and electronic appliances. Total throughput of cargoes at Bangkok, the major port of Thailand for international trade, was 6.8 million tons in 1983 compared with 3.6 million tons in 1976.

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15. The importance of sea-borne international trade for developing countries cannot be over stressed. At the same time extension of trade among the ESCAP developing countries as a means of enhancing collective self-reliance is one reaction to economic development needs, including the utilization of national resources to further mutual development. Exploiting the opportunity to increase trade between developing countries can create an agreed import substitution policy within which collective development is more effective than individual.

16. The transport intensity per capita of the ESCAP developing countries is still low and does not exceed 1.5 tons. For developed nations such as France or the Federal Republic of Germany, the equivalent figures are 4 or 5 5 tons. In general, where developing ESCAP countries are either island states, states with long coastlines or states with extensive waterway systems, new shipping technologies are going to play an important role in the transportation sector. They will affect international deep sea shipping and inter-island, coastal and inland waterway shipping. The new technologies now being mainly applied at the international level will penetrate ever deeper into domestic transport.

II. HISTORICAL DEVELOPMENT OF THE MERCHANT MARINES OF ESCAP DEVELOPING COUNTRIES

17. International trade figures may no longer be directly transformed to express the shipping capacity required to cater adequately to trade needs. The time of the almost all-purpose conventional freighter has passed. New and different transport technologies have been developed to achieve at the most efficient and cost-effective conveyance of large-volume, single commodities or of groups of commodities requiring identical handling and transport techniques. Sea transport is more and more being viewed as a link in a total transport system from producer to consumer. Many commodities are being carried in vessels which are, to a high degree, single-purpose and commodity-specific. It is typical of such vessels that they are not interchangeable between systems. This places a particular burden on the organization of shipping.

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2/ The Current Situation of Japanese Shipping (Tokyo, Japan Maritime Development Association, 1984), fig. 1.

18. The shift away from the conventional, all-purpose, break-bulk vessel is not a recent development. Passenger liners and oil-tankers were amongst the first forms of specialization in seagoing transport. Dry bulk cargoes initially continued to be shipped in conventional vessels although this often required special measures and provisions to safeguard ship stability and seaworthiness. It was only much later that special vessels were designed to accommodate dry bulk cargoes. For some time these four major groups of vessels (general cargo, liquid and dry bulks, and passengers) represented the only forms of specialization.

19. Changes began in the 1950s with passenger vessels slowly fading out of the liner trade and moving into the tourist trade. Today, there are few passenger liners employed on ocean routes. This left the commercial merchant marines subdivided according to the goods they carried with the main divisions still being general cargo, liquid bulk and dry bulk. It is within these major groupings that modern technologies developed and the current situation and trends may, in broad outline, be reviewed.

20. The growth of the merchant fleets of the ESCAP countries has enabled them to capture a greater share in world totals (see table 2). Within the Asian and Pacific region this growth has been by the developing countries at the expense of the developed countries. While in gross registered tonnage the Asian and Pacific region increased its share of world capacity by 2.4 per cent during the period 1974-1982, the share of the developed countries (Australia, Japan and New Zealand) declined by 2.6 per cent and that of the developing ESCAP countries increased by 5 per cent. Comparable figures apply to deadweight capacity figures. An analysis of the growth of the average ship size shows that while during the same period the average vessel outside the region became 12 per cent bigger, the corresponding figure is 13 per cent for Asia and the Pacific. Broken down into developed and developing country groupings, there was almost stagnant growth (+ 1 per cent) for the former and a high rate of growth (+32 per cent) for the latter grouping.

21. These figures imply that within a relatively short period ESCAP seafarers had to deal with and handle larger numbers of bigger and more sophisticated vessels, requiring increased levels of competence and capabilities. Equally, this applied to those indirectly involved with shipboard management (e.g. repair, planning and spare-part management).

/Table 2.

Table 2. Growth of merchant fleets in the Asian and Pacific region

(Percentage of world totals)

Year	Number of vessels			Gross registered tonnage			Deadweight capacity		
	ESCAP	Developed	Developing	ESCAP	Developed	Developing	ESCAP	Developed	Developing
1974	24.0	17.1	6.9	17.8	12.9	4.9	17.3	12.9	4.4
1975	24.5	16.7	7.8	17.2	12.0	5.2	16.8	12.0	4.8
1976	24.0	15.6	8.4	17.5	11.5	6.0	17.2	11.6	5.6
1977	24.1	15.0	9.1	17.3	10.6	6.7	16.8	10.5	6.3
1978	24.1	14.3	9.8	17.4	10.1	7.3	16.8	10.0	6.8
1979	25.2	14.8	10.4	18.4	10.2	8.2	17.8	10.1	7.7
1980	25.8	15.1	10.7	18.7	10.2	8.5	18.1	10.1	8.0
1981	26.3	15.0	11.3	19.4	10.2	9.2	18.7	10.1	8.6
1982	26.8	15.1	11.7	20.2	10.3	9.9	19.6	10.2	9.4

Source: Based on Lloyd's Register of Shipping, statistical tables.

22. Cost considerations were instrumental in the development of new techniques which aimed at increasing the production of cargo-handling operations per unit of time in order to reduce the cost of port labour and of a ship's stay in port. Several technologies came into being, of which palletization and containerization have at present penetrated deepest into the general cargo trade.

23. The use of pallets has allowed smaller parcels within a shipment to be consolidated into bigger units resulting in more rapid handling. As units thus became unsuitable for manual handling, not only their vertical movements (in actual loading/discharging) but also the horizontal movement ashore necessitated mechanization in order to reap the benefits from this technology. It did not take long before disposable pallets came into use as a base for unitization in a door-to-door transport system. Palletization set the transport industry on the path of through-transport and intermodal systems.

24. Palletization placed specific requirements on the industry. Highly manoeuvrable rolling equipment for the lifting and transport of goods had to be acquired for use in ports, at shippers or consignees sites, and in ships' holds. Added importance had to be assigned to facilities for maintenance and to spare-part management. Palletization, however, allowed existing equipment to remain in continued use, although it required certain port infrastructural improvements. Quay aprons were widened. Surfaces were made level and often strengthened to withstand the higher point loads of the wheels of cargo-handling equipment. In terms of organization, the system presented a host of problems involving cargo-clearance procedures, effective road/rail vehicle utilization under national regulations on vehicle width, adjustments in packaging, pallet sizes and strength, labour deployment, and safety regulations, among others. Solutions were found for such problems, often on the basis of internationally agreed measures, procedures or standards.

25. The construction of vessels, specially designed to operate within the concepts of unitization, came only when the systems were already well developed and widely accepted for use in conventional carriers. Some typical features of the new type of vessels were:

(a) Replacement of cargo-derricks by shipboard cranes;

(b) Hatches abreast to allow for spotloading;

(c) Flushed hatch coamings in strengthened tween-decks for use of rolling handling equipment;

(d) Holds and tween-deck clearance heights related to dominant pallet trades;

(e) Side port loading facilities, particularly on short sea routes.

26. Outwardly these vessels very often resembled traditional break-bulk cargo vessels. The growth and further development of this fleet were almost completely halted when the full potential of containerization as a system was recognized as offering greater economies. Today, vessels carrying general cargo can be divided into two main categories, conventional break-bulk/multipurpose carriers and container vessels. Lloyd's Shipping Economist estimated the world supply of general cargo vessels to be approximately 107 million dwt capacity in mid-1984; 80 million dwt conventional capacity and 27 million dwt containerized capacity.[3/] From these figures, it would

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3/ Lloyd's Shipping Economist (London), vol. 6, No. 9, (September 1984), p. 19.

seem that the break-bulk fleet predominates, yet it must be realized that the majority of the units in this fleet are below 15,000 dwt and are utilized in inter-island or coastal trades. Container vessels, because of their higher speeds, greater average load-factors, and quicker port despatch carry the majority of liner cargoes on the medium- and long-distance sea routes, and increasingly on feeder services.

27. Containerized shipping capacity is expressed either in twenty-foot equivalent unit (TEU) containers per vessel or in TEU slots per annum per service. There is no hard and fast formula for the relationship between deadweight tonnage (dwt) and TEU capacity, but based on dwt capacity figures given in Lloyd's Shipping Economist, and applying rela relationships between dwt and TEU as derived from other sources, a subdivision of the container fleet capacity as per April 1984 would approximately as follows:

Category	Million dwt	Million TEUs
Full container	15.9 (60 per cent)	1.0 (69 per cent)
Part container/barges	4.9 (18 per cent)	0.2 (10 per cent)
Ro-Ro vessels	5.8 (22 per cent)	0.3 (21 per cent)
Total	26.6	1.5

28. The world order book of liner vessels, as compiled by Lloyd's Shipping Economist at the end of first quarter of 1984 showed a continuing shift, worldwide, to containerization in liner shipping (see figure I).

/Figure I.

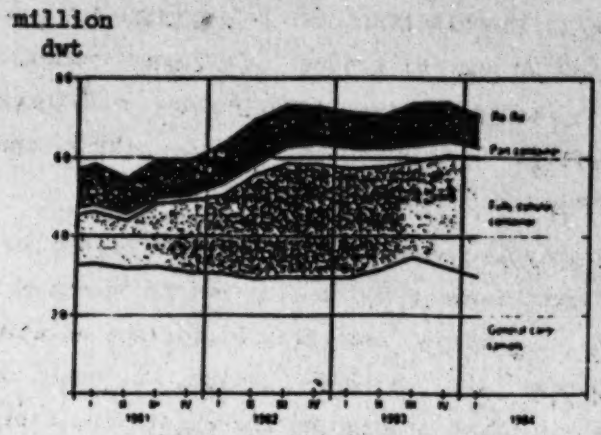

Figure I. World Orderbook of Liner Vessels (newbuildings on order at end of quarter

Source: Lloyd's Shipping Economist (London), vol. 6, No. 5 (May 1984), p. 18

29. In this context, the findings of a study entitled The Competitive Dynamics of Container Shipping are not only interesting but relevant to many situations in the Asian and Pacific region, and demonstrate the penetration of containers into conventional shipping markets.

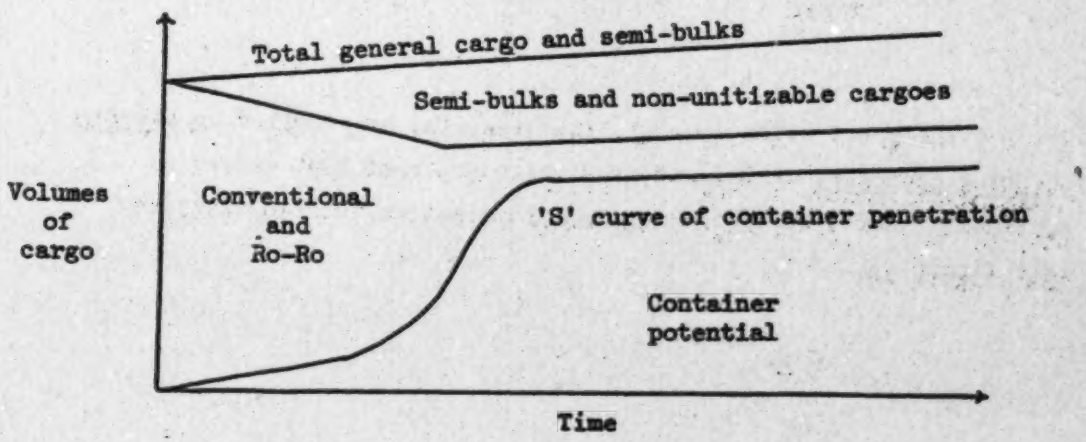

Figure II. The Restructuring of conventional markets

Source: The Competitive Dynamics of Container Shipping as cited in Touche Ross & Co., Regional Transport Survey of the South Pacific (London, 1984), p. 20.

30. In figure II, where time-scale and starting point are route-specific, it is shown that conventional systems can carry only a limited number of containers. As the penetration of containers in a particular trade increases, a point is reached where new tonnage is required. This generates a strong incentive to switch completely to a new type of vessel. Even in developing countries the container markets can grow very rapidly, as is shown by the steep slope of the "S" curve. Parallel to this container penetration is the introduction of semi-bulk vessels to move those types of general cargo not suited to container transport but available in attractive quantities. To what extent these effects can be minimized or postponed is difficult to say but it would seem that preventing their development may, in the long run, turn out to be a costly delay.

31. The need to operate specialist vessels according to trade or commodity requirements has severely taxed the financial resources of shipowners. Container vessels have a typical history in this respect. First-generation container vessels were designed with a capacity of up to 1,300-1,600 TEUs and speeds in the region of 20-22 knots, powered mostly by steam turbines for slow-speed steaming through the Suez Canal. When the Canal closed this generation of vessels, because of the greater distances to be sailed became less efficient. More efficient second-generation vessels were designed with a capacity of up to 3,000 TEU, speeds often exceeding 26 knots and general dimensions limited to the capacity of the Panama Canal locks. Events such as the oil-price hike and the reopening of the Suez Canal again caught shipowners out. Second-generation vessels also became very costly to operate. The third-generation vessels were designed in the same order of capacity but with much lower operating costs. In order to save fuel and operate at lower cost these vessels were designed for lower speeds allowing greater hull width and proportionately greater capacity, up to 3,400 TEU. While these vessels may represent ultimate economies on long-distance, high-density routes, the present preference for general worldwide employment calls for medium-sized container vessels of 1,800-2,000 TEU capacity operating at 23 knots and requiring only 35,000 brake horsepower. This is achievable with single slow-speed diesel propulsion on a single screw.

32. The average size of the deep-sea, fully-cellular vessel, is, however, of small capacity, not exceeding 1,000 TEUs. The trend is to introduce

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larger and more efficient ships, but norms tend to develop in relation to ship dimensions because of a desire to standardize, particularly in port design. The cost of redeveloping ports is so high that very substantial gains would have to be made in ship operation costs, and these are at present seemingly not available.

Table 3. Container vessels (full cellular)

(Percentage of world totals)

Year	ESCAP totals		Developed ESCAP countries		Developing ESCAP countries	
	Numbers	grt	Numbers	grt	Numbers	grt
1974	14.8	18.9	11.7	17.6	3.1	1.3
1975	15.8	20.4	12.4	19.1	3.4	1.3
1976	15.6	20.0	12.4	18.6	3.2	1.4
1977	18.7	20.2	10.8	18.0	7.9	2.2
1978	19.8	21.5	10.6	16.2	9.2	5.3
1979	22.9	24.2	10.6	15.3	12.3	8.9
1980	24.8	26.5	10.9	15.1	14.1	11.4
1981	25.7	28.1	10.2	14.1	15.5	14.0
1982	25.5	27.5	10.4	14.2	15.1	13.3

33. While the average size of the fully-cellular vessel owned by the ESCAP developing countries in 1974 stood at approximately 6,000 grt, eight years later the average size had grown to almost 16,000 grt. World averages were 15,300 grt in 1974 and 18,000 grt in 1982.

34. The competitive trading efficiency of semi-container ships (designed for a mixture of container and break-bulk stow) depends on flexibility in the use of space (or the capability of handling a wide range of cargoes) and on a small size offering better access to cargo than other ship types. While viable on medium-length routes, their poor ratio of container to bale-space capacity becomes ever less competitive as container penetration increases. Eight hundred TEUs is expected to be the maximum practical capacity in this category for the foreseeable future.

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35. The developments of long-distance Ro-Ro operations was particularly enhanced by the trade boom with the members of the Organization of Petroleum Exporting Countries. The sea/road-trailer system offered a ready solution to the problems arising from the traditionally designed and heavily congested ports. Ships could secure sufficiently great savings to compensate for the higher costs arising from port congestion, and these savings eased the economics of long distance. However, the demand for Ro-Ro operations has diminished and operators of the Ro-Ro fleet have gone through difficult times, leading to very serious financial problems. Of late, the market has shown some improvement and an impressive build-up is taking place. In March 1984, a trans-Atlantic operator took delivery of the first of five G3-type vessels (36,700 dwt; 2,157 TEU) while a round-the-world service received the first "super carrier" (44,000 dwt; 2,437 TEU). In the context of poorly equipped ports, there may continue to be a preference for self-sustaining vessels. Within this group of vessels Ro-Ro's are valuable for ports with weaker, but otherwise suitable wharves. In addition, the Ro-Ro concept in ferry services is well established, but this is a relatively unexploited method of operation in the Asian and Pacific region. Long-distance Ro-Ro operations in the region seem to be limited to the USSR/Singapore/Viet Nam run, the Australia/Western ASEAN run and the China/United States run.

36. The demand for liquid bulk carriers is mainly pressed by oil consumption in regions which are unable to meet their total oil requirements. Before the oil-price hike the Middle East was the main supplier of mineral oils for shipments worldwide in ever-increasing quantities.

37. Although a specialized type of shipping, participation in liquid bulk carriage did not initially pose too many problems to developing countries, but when economies of scale pressed for larger and larger vessels, requiring, amongst other things, substantial port infrastructural adjustments, and when more detailed specialization in specific product carriage developed, the merchant marines of the developing countries moved into a disadvantaged position. This was aggravated by the fact that the world over-supply in VLCC and ULCC tonnage caused these vessels to encroach into the trades of the medium-sized tankers (40,000-150,000 dwt) which in turn impinged on the traditional routes for the small-sized tankers (10,000-40,000 dwt). It is

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in this tonnage range (and the lower brackets of the medium-sized tankers) that most of the tanker tonnage of the ESCAP developing countries is positioned. Although there was a much better balance in the supply-demand situation in these smaller categories, and the aggregate tanker surplus (at one time in the region 70 per cent of demand) was mainly attributable to VLCC and ULCC tonnage, the above-mentioned impingement caused many small-sized tanker operators to experience financial difficulties, and many such shipowners in the regior were hard hit in spite of their economically suitable tonnage.

38. A breakdown of the fleets in the Asian and Pacific region for liquid bulk trading and their share of world tonnage, as shown in table 4, makes clear the development of these fleets over a 10-year period (1974-1983).

Table 4. Breakdown of world and Asian and Pacific fleets, 1974 and 1983
(Liquid bulk carriers)

	1974				1983			
	Number	(Percentage)	grt	(Percentage)	Number	(Percentage)	grt	(Percentage)
Tankers								
World total	6 785	(100)	129 491 446	(100)	6 682	(100)	157 278 981	(100)
ESCAP total	1 903	(28.0)	18 966 933	(14.7)	2 364	(34.3)	26 122 401	(16.6)
ESCAP developing	353	(5.2)	2 699 291	(2.1)	876	(12.7)	9 280 356	(5.9)
ESCAP developed	1 550	(22.8)	16 267 642	(12.6)	1 488	(21.6)	16 842 045	(10.7)
Liquid gas carriers								
World total	399	(100)	2 414 843	(100)	750	(100)	9 079 280	(100)
ESCAP total	153	(38.4)	504 408	(20.9)	293	(39.0)	1 316 148	(14.5)
ESCAP developing	13	(3.3)	10 978	(0.5)	61	(8.1)	410,239	(4.5)
ESCAP developed	140	(35.1)	493 430	(20.4)	232	(30.9)	905 909	(10.0)
Chemical tankers								
World total	291	(100)	748 139	(100)	794	(100)	3 135 906	(100)
ESCAP total	169	(58.1)	98 099	(13.1)	382	(48.1)	423 947	(13.5)
ESCAP developing	6	(2.1)	14 781	(2.0)	41	(5.2)	144 754	(4.6)
ESCAP developed	163	(56.0)	83 318	(11.1)	341	(42.9)	279 193	(8.9)
Miscellaneous tankers								
World total	95	(100)	122 334	(100)	137	(100)	304 392	(100)
ESCAP total	29	(30.5)	30 531	(25.0)	51	(37.2)	53 379	(17.5)
ESCAP developing	1	(1.0)	1 572	(1.3)	8	(5.8)	11 717	(3.8)
ESCAP developed	28	(29.5)	28 959	(23.7)	43	(31.4)	41 662	(13.7)

Source: Based in Lloyds' statistical tables.

Note: Combination bulk ore/oil carriers are not included in above review.

39. The degree to which specialization and unit-capacity increase affected the ESCAP tanker fleets can also be illustrated through specific comparative growth figures (see table 5).

Table 5. ESCAP tanker fleets: comparative growth figures - 1983 versus 1974

Vessel type	Developing countries				Developed countries			
	Numbers (percentage)	grt (percentage)	Average unit size 1983 grt	Average unit size Percentage	Numbers (percentage)	grt (percentage)	Average unit size 1983 grt	Average unit size Percentage
Tankers:								
Oil	+ 150	+ 245	10,600	+ 40	- 5	+ 5	11,300	+ 10
Liquid gas	+ 370	+ 3635	6,700	+ 700	+ 65	+ 85	3,900	+ 10
Chemical	+ 580	+ 880	3,500	+ 45	+ 110	+ 235	800	+ 55
Miscellaneous	+ 700	+ 645	1,500	- 5	+ 50	+ 45	950	- 5

Source: Based on table 4.

40. The merchant marines of developing countries are growing at a pace which increases their share of world tanker tonnage. There is, moreover, a tendency within the Asian and Pacific region that the bigger units of these specialized tonnages are under the registry of the developing countries.

41. Drewry Shipping Consultants of London have recently estimated that in 1985 there will be a demand for deep-sea employment of LPG carriers of the order of 3.3 million m^3 and that this will reach 6.6-8.4 million m^3 by 1990. A detailed survey of the LPG trade and resulting transportation indicates that the current fleet capacity surplus will be absorbed by 1986-1988.

42. Like other sectors, the bulk-carrier sector has suffered from excessive ordering, partly perhaps due to over-optimistic expectations in respect of increased coal transport. Coal and iron ore transport volumes have always been strictly related to world steel production and this seems to be, at least at present, the principal parameter governing the health of the bulk-carrier market. Grain, the third major bulk commodity, does not provide much hope as trade is highly vulnerable to short-term price

/shifts

shifts in the commodity and has shown little stability. That the crisis in the carriage of dry-bulk cargoes would have detrimental effects to other commodity- or size-types within the group was to be expected. That dry-bulk carriers, by transporting containers on empty back-hauls, would encroach on a specialized general cargo area has been a less pleasant surprise.

43. From the information available it would seem that the shipowning community in the Asian and Pacific region has been primarily concerned with national requirements for dry-bulk shipping capacity, although a number of operators successfully participate in complex worldwide trading and tramping. The breakdown of the ESCAP fleets of dry-bulk carriers and their share in world tonnage in table 6 shows development over the 10-year period 1974-1983.

Table 6. ESCAP dry-bulk carrier fleets, 1974 and 1984

	1974				1983			
	Number	(Percentage)	grt	(Percentage)	Number	(Percentage)	grt	(Percentage)
				Combi (bulk-oil) carriers				
World total	384	(100)	22 034 582	(100)	418	(100)	26 031 554	(100)
ESCAP total	62	(16.1)	4 012 054	(18.2)	75	(17.9)	4 913 190	(18.9)
ESCAP developing	16	(4.1)	795 456	(3.6)	51	(12.2)	2 870 308	(11.0)
ESCAP developed	46	(12.0)	3 216 598	(14.6)	24	(5.7)	2 042 882	(7.9)
				Ore and dry-bulk carriers				
World total	3 111	(100)	57 403 390	(100)	4 655	(100)	98 365 123	(100)
ESCAP total	548	(17.6)	12 445 235	(21.7)	1 088	(23.3)	27 644 443	(28.1)
ESCAP developing	146	(4.7)	2 624 856	(4.6)	700	(15.0)	15 143 533	(15.4)
ESCAP developed	402	(12.9)	9 820 379	(17.1)	388	(8.3)	12 500 910	(12.7)

Source: Lloyd's statistical tables, 1974 and 1983, table 2.

44. Over that same period the average grt capacity per vessel increased as follows:

Combi-carrier:	Developing ESCAP:	to 56,280 grt + 13 per cent
	Developed ESCAP:	to 85,120 grt + 22 per cent
Ore-bulk carrier:	Developing ESCAP:	to 21,634 grt + 20 per cent
	Developed ESCAP:	to 32,219 grt + 32 per cent

45. There are other specialized shipping services, each representing a particular chain of developments to meet demands in the most efficient way. Their adoption by the ESCAP developing countries is, however, only small scale. Examples are:

(a) Refrigerated transport of perishable goods in reefer vessels. Mostly concentrated in the transport of meat or fruit (reefer or cooler cargoes), there are not yet sufficiently dense cargo flows of this type to induce their regular use. In fact, the few small capacity reefer/cooler vessels are seriously threatened in their continued employment by the much more flexible use of reefer/cooler containers;

(b) Heavy-transport vessels have only a very limited market worldwide. The expertise and marketing capabilities for this type of transport, often requiring high-technology submergeable equipment, is at present concentrated in a very few companies only;

(c) Ocean salvage and towage, when it concerns assistance to vessels in distress may be undertaken out of many ports in the Asian and Pacific region. Where it concerns commercial salvage or towage as transport it is again the domain of a few highly specialized operators who provide their services worldwide.

III. THE EFFECTS OF NEW SHIPPING AND CARGO-HANDLING TECHNOLOGIES

46. Modern shipping techniques require that ships stay in port to load and unload for as short a time as possible. This requirement has governed the port despatch of ships even under conventional sea-transport systems in the past, but with systems becoming more specialized and fine-tuned to achieve high throughput performance and with the ever-increasing capital investment required the penalties for ignoring requirements for fast turnround are becoming prohibitively expensive. This applies both to ship and port operators, and should thus cover all types of vessels and all port loading and unloading facilities.

47. A major aspect to be looked at in this context is the type of cargo to be handled. In spite of all that is said and written, conventional general cargo still plays a very important role in many ports and the role of new techniques in ports is often less than brochures and write-ups would indicate. In Paragraph 2b, reference was made to the predominance of conventional breakbulk general cargo vessels. Of relevance is the fact that the Asian and Pacific region contains the greatest number of island countries and territories, enormous archipelagic areas, and many countries with long coast lines. Clearly coastal and inter-island shipping in the region is not yet functioning as a system-bound extension of the international shipping patterns.

48. The degree to which cargoes are still being handled in conventional break-bulk fashion, particularly on intra-regional and domestic trades, is such that it continues to warrant full attention being given so as to increase efficient handling. Even with increased containerization, break-bulk shipping will not disappear in the near future. For certain trades in the region an arrangement of conventional cargo and palletized, pre-slung, pre-strapped, shrink-wrapped or other forms of unitization could already provide substantially improved throughputs without the heavy financial burdens of more sophisticated techniques. Good, modern and well-maintained multi-purpose cargo-vessels would have no difficulties with such a cargo mix, and depending on the vessel itself, a limited volume of containerized, heavy-lift, cooler/reefer, liquid bulk-cargo, or some Ro-Ro shipments could even be accommodated.

49. While recognizing the continued role conventional shipping and the early forms of unitization will continue to play, it is at the same time impossible to disregard the rapid advance of more complicated shipping techniques. Of particular importance is containerization. Containerization in the developing countries of the region was extensively reported to the Committee at its fifth session.[4/] Its impact on shipping was reported to the Committee at its sixth session.[5/]

/50.

4/ "Containerization in the developing countries of the ESCAP region in relation to shipping, ports and inland waterways" (E/ESCAP/STC.5/32)

5/ "Impact of containerization on shipping in selected developing countries of the ESCAP region" (E/ESCAP/STC.6/7), "Impact of containerization on ports in selected developing countries of the ESCAP region" (E/ESCAP/STC.6/8), and "Impact of containerization on shippers in selected developing countries of the ESCAP region" (E/ESCAP/STC.6/9).

50. The main thrust of containerization has been in the major ports (one or a few per country) in the region and although there are noticeable and prominent exceptions, little containerized traffic went beyond the port/port city area unless through domestic shipping. Yet, in the future national second-level ports are certain to be touched by the more sophisticated and capital-intensive technologies. It is perhaps the greatest challenge to be faced in the foreseeable future. Containerization, having become firmly established on main routes and in major ports, is about to be applied to domestic shipping, inland waterways and landbased transport.

51. In spite of a global recession the use of containers has grown rapidly and many entrepreneurs in the Asian and Pacific region have moved into the container manufacturing business. Container supply for some time now has overtaken demand, and the margin is growing fast. At present, box utilization is registering an all-time low level. Even container productivity ratios have declined, falling from an average of 45 tons/container/annum in 1976 to a current level in the region of 32 tons. The container leasing sector of the industry has been particularly hard hit as shipping companies endeavour to concentrate on their own equipment. Furthermore, the intensifying competition from expanding low-cost carriers against declining traffic flows has contributed to the reduction in demand for leased containers. It has been estimated 6/ that the idle units of leasing companies now total approximately 1 million TEU. Many of these idle boxes are stacked at ports in the developing ESCAP countries and their continued availability will add pressure to the search for their use in alternative trades, e.g. the domestic trade, giving further impetus to the spread of containerization.

52. Such a spread of containerization would require massive capital investment. Where it concerns the development of ports, their approaches from the sea, and road or rail connections to the hinterland, such investment is usually arranged by the Government. Yet shipping, and for that matter road hauliers' equipment, have traditionally been financed from private sources. The inability of most indigenous private entrepreneurs to secure adequate funding compelled many developing countries to take an active role in financing the new merchant fleets, which at the same time served to give them a much improved control of certain maritime developments.

/Now

6/ "The Container crisis", Asian Shipping, January 1983, p. 30.

Now that port and shipping industries are established and financial resources are hard to come by in the public sector, there are several indications that a growing trend of privatizing government-owned assets in the maritime sector will continue. Shipping thus will have to compete with other industries and government responsibilities for a share in development financing.

53. In examining the future need of the shipping industry to raise the capital to finance not only its expansion or its replacement programme but to replenish its working capital run down during the recent recession, it must be realized that private sector shipping, still amongst the largest single private sector industries in the world, has rarely been able to attract investment other than from the narrow ranks which make up the very ownership of the shipping structure itself. While this has allowed a few entrepreneurs to amass huge fortunes through astute timing of ordering, buying and selling of ships against an environment characterized by a remarkable coincidence of developments (world trade growth, continued inflation of capital goods, tanker capacity shortage, abundant financial resources and an expanding Eurodollar market) such a situation, although still fresh in the memories of many, is very foreign to the private shipping industry and the present and future situation is decidedly different.

54. The rules that governed the development and growth of fleets in composition, type, shape and size of ships, have fundamentally changed with the introduction of new technologies, even more so in the last five years of recession with a severe down-turn in business. Shipping, which after all is a service industry to world trade, is finding itself burdened with seriously diminished capital resources at a time when world trade may emerge from the recession vitally different from the past patterns on which the fleets were shaped, and this at a time when few governments are willing to reconsider their shipbuilding policies in order to reduce worldwide overtonnage.

55. The shipping industry has been fundamentally dependent on commercial bank lending and, given the currently depressed state of the freight market and its rate-setting machinery, it is likely to remain dependent on the banks for some time to come. Multinational financing through government banking institutions has not earned itself the reputation, among shipowners in the developing countries, of being a really cheap or attractive alternative to commercial loans. As shipowners ride out the financial storms created by the current world recession, and aggravated by the excessive ordering of

/tonnage

tonnage in the past (perhaps the single biggest miscalculation made by private enterprise in recent corporate history) it is considered opportune to highlight the problems facing the shipping industry in its constant search for capital. It is equally opportune to realize that among shipowners having to face the consequences of spreading containerization are many small-scale operators, few of them (if any) government-owned, but many with less credibility or management capabilities than their bigger colleagues from the deep-sea international trade. Yet, the role of these small-scale operators cannot be considered less important to the overall vitality of the industry.

56. One avenue open to the smaller shipowners by which to enhance their position vis-a-vis the banking institutions, and operationally in regard to trade circles, is closer co-operation among themselves. Such co-operation could cover a wide range of possibilities from membership of an association, through various forms of joint operation or pooling, to complete mergers. History has shown how the bigger shipping companies of the traditional maritime countries opted for positions along this avenue, and even cross-border positions, to remain in business with possibilities for further development safeguarded. The shipping industry of the developing countries in the Asian and Pacific region in general is still characterized by a fierce desire to retain identity and to remain loyal to the service of particular interest groups, even when a compromise on the development of the company is necessary. Yet clear signs of constructive co-operation between the bigger operators are emerging and there is no reason to assume that smaller operators, once well versed in the many options for co-operation available, may not decide to utilize existing opportunities.

57. Against the background to the conclusions and concluding remarks on the impact of containerization in the region, as mentioned in the documents presented to previous sessions of the Committee (see paragraph 49), 1/ it would seem that, as to their general context and trend, they still hold true, even though developments may have changed situations at individual national or port levels. What would be additional circumstances are:

(a) The expected spread of containerization beyond established major terminals and routes;

/(b)

1/ These conclusions have been annexed to the present document.

(b) The involvement of a level of smaller operators (shipping, ports, roadhauliers etc.) in containerization with a substantially increased manpower force also involved;

(c) The more precarious financial position of the shipping industry, severely limiting its capability for a proper response to changing trade and shipping patterns.

58. Reviewing the impact of other new shipping technologies in the region, such as bulk handling, the focus in general is less on common-user facilities and more on industry-specific techniques. Both liquid- and dry-bulk commodities are handled and shipped from facilities designed and developed, and frequently operated, by a particular industry. As a result, problems are usually not connected with the facilities as such, but are rather the result of shortcomings in the operational management of the systems in part or whole.

59. In this context it has been observed that bulk terminals (for ores, grains etc.) when operated by a port seem to be more susceptible to operational deficiencies than when under industry control. It has been noted during fact-finding missions that where economies of scale were sought by the use of very large vessels, receiving arrangements for the bulk commodity were at times so poor at unloading or feedering sites that savings were inadequate to cover excessive "in-system" time of main carriers.

60. Bulk-handling terminals also involve high capital expenditure and while this total amount per berth may vary with capacity or commodity to be handled etc. There is the continued need to keep the terminal operating at not less than its designed efficiency in the total transport chain. System design aims at having each separate activity perform at least cost per unit. For that reason the choice is, for example, to have large vessels, resulting in lowest transport cost per ton. Yet if that large vessel is kept unduly long before it is loaded or discharged (time in-system), resulting in high "in-system time cost", the terminal involved will not attract customers in a competitive market. There can be many reasons for poor turnround of vessels at a terminal, but the problem tends to become obscured when no alternative possibilities are available. This situation is very prevalent in the Asian and Pacific region where terminals often operate from a monopoly position and the share in the overall commercial accountability for the international competitive pricing of the commodity is either not well defined, not well monitored or is otherwise vague. With many countries

/insisting

insisting on the meaningful participation of their merchant fleets in national import/export carriage it is, in the first instance, the national shipping industry which is affected by terminal operational deficiencies.

IV. MANPOWER DEVELOPMENT

61. Development of manpower to deal with the advancing new technologies has received ample attention in the region. The work programme of the secretariat bears proof of the great importance which it accorded to manpower development programmes. Generally speaking, activities within these programmes have been focused on specific topics in problem areas or of particular interest. The target audience in most cases was at the higher levels of middle management or at top-management levels. In addition to training courses, seminars etc. organized by other bodies, or by the shipping and port industries themselves, it is believed that, in the overall context, a well-balanced and dynamic programme has been, and still is, available to the region. Developments in the technical and operational field, as well as in management techniques, system management, information etc. are closely watched as to their acceptance in the region, the problems encountered and assistance required.

62. Manpower development activities tend to move and progress in time. Subjects once or twice dealt with are replaced by more current topics, latest developments are closely followed. The inherent result is that the programmes also tend to accompany a rather defined generation of managers and government officials. The thrust of new technologies is focused on major ports and major routes, or on specialized handling facilities. This has contributed to the target audience being selected from amongst that limited group of people in the region who were and still are most heavily involved. This practice has served the purpose extremely well and is likely to do so satisfactorily in the future.

63. With the expected greater application of new shipping technologies in the region, and in particular the spread of containerization, and the resultant need for the widespread use of electronics and microprocessors to achieve optimum returns on capital invested, there is concern that the manpower development programmes of the secretariat as they are now, are:

(a) Insufficiently repetitive to serve the upcoming generation of young managers;

(b) Insufficient in capacity to meet the demands of a much larger and more diverse target audience;

/(c)

(c) Insufficiently oriented on local conditions and situations to serve the needs of the new target audience.

64. Should these concerns be considered valid then another additional level of manpower training may have to be developed which is less focused on the actual organization of manpower development activities, but rather concentrates on assisting selected national institutes to provide adequately for such national training needs as may be identified. Training and upgrading of instructors would carry higher priorities in such programmes than actual staff-training. This particular form of training is not new. Many training courses etc. exist and are incorporated in regularly executed programmes. Such training opportunities should be fully taken into account and only where they are considered to be insufficiently comprehensive or otherwise defective or short in output should assistance programmes be initiated.

/Annex

Annex

CONCLUSIONS AND CONCLUDING REMARKS FROM EARLIER PRESENTATIONS

A. Report on a reconnaissance study of containerization in India, Malaysia, the Philippines and Thailand, 1980 (E/ESCAP/STC.4/23)

Shipping

(1) Container shipping has arrived and is growing rapidly in the countries surveyed. It has penetrated all levels of shipping: coastal (domestic), regional (feeder and interport) and ocean routes (mainline), although the degree of penetration varies from country to country and according to trading routes. All the countries surveyed experienced, and will continue to experience, high annual growth rates in container movements. This is due in part to shipowners' optimistic outlook towards the adoption of container technology.

(2) Trans-shipment has become an important characteristic of containerization in the ESCAP region and some ports have shown high growth rates because of it. Some countries are becoming increasingly dependent on competitive feeder services to foreign trans-shipment ports with their resultant benefits for shippers in terms of freight cost and quality of shipping services.

(3) The national lines (ocean, regional and coastal) have availed themselves of the container technology and are participating in varying degrees in co-operation with international container operators.

(4) The form of liner shipping appears to be changing from loose co-operation within the conference system to intensive partnership within various consortium arrangements. The existence of competing consortia and the strong presence of outside individual operators have brought about competitive freighting in some major liner routes.

(5) The newly emerging container countries are experiencing freight rates which could be lower if institutional obstacles on the shore side were ameliorated or removed and if proper ship types were introduced.

(6) In the 1980s the ESCAP region is likely to witness increasing investment in container vessels, from the smaller carrier for domestic routes to the large sophisticated ocean vessels. Enormous amounts of capital, relative to that required for conventional vessel replacement, are necessary. This higher level of capital investment would in turn

/have

have to be matched by improvements in managerial skills, particularly in the areas of financing and choice of vessels. These are areas which could benefit from technical assistance from the more advanced maritime countries and require investigation.

Ports

(1) All countries surveyed in the present study reported faster port turn-around times of container-carrying vessels and higher throughputs of cargo even at berths where no specialized gantry cranes exist. This improvement in port capacity reflects the inherent flexibility of containerization and underlines an important principle: that containerization can effectively upgrade port capacity without recourse to expensive gantry cranes and specialized equipment. In fact, for many of the ports in the ESCAP region it is important to stress that such expensive equipment is probably unnecessary until high levels of throughput are reached.

(2) It is worth stressing too, that intermodality is not a prerequisite for the effective development of containerization in developing countries. In fact, it may be suggested that in the developing countries highest priority should be given to upgrading port efficiency rather than to the intermodal requirements of containerization.

(3) This lack of intermodality of container movements together with the characteristics of commodity flows to and from developing countries is, however, reflected in the need for much larger storage and container freight station capacities than is associated with container developments in developed countries. Unfortunately, this point seems to have escaped the notice of consultants and planners and most estimates of required storage capacity have been wrong.

(4) There are a number of other points worth emphasizing. First, that containerization presents ports with the opportunity to reformulate their pricing and tariff systems. It was apparent from the survey that ports were not aware of their container handling costs. Such costs must become the basis for effective pricing systems. Second, that container technology is creating new and different demands on labour and management. Labour redeployment schemes must be evaluated in the light of existing manning levels. Additionally, private labour is frequently used in preference to port labour, where this is allowed. This raises the issue of private investment in port operations. Third, that documentation and institutional procedures are often unduly complex and cause delay.

/(5)

(5) Given the preliminary nature of the present survey of containerization it is clear that a number of problem areas require further analysis. These might be listed as follows:

(a) The capacities required for container freight stations and their locational requirements;

(b) The quantification of improved berth productivities and the prediction of new berth capacity requirements;

(c) Existing pricing and tariff systems in the light of containerization in ports and based on cost of handling containers;

(d) Existing labour organization, pricing and redeployment schemes;

(e) Complexity of documentation requirements, Customs procedures etc.;

(f) The basis of private participation of port users in the operation and development of terminal facilities.

(6) It may also be appropriate to suggest the need for a special team (or teams) of experts, with regional experience, to undertake specific missions to ports on an ad hoc basis and at the request of member Governments.

Shippers

(1) Containerization has been viewed with some scepticism by shippers but it is apparent that they do not appear to be worse off. In fact, shippers now appear to favour the container mode of transportation. This does not alter the fact that the cost of container shipping should be investigated to ascertain the level of savings which may be possible.

(2) Containerization alters the system of charging for liner services. Competitive freighting has, in addition, eroded the traditional form and method of levying freight rates. Furthermore, from the fragmentary evidence obtained, containerization seems to have an uneven effect on different groups of shippers, depending on the stage of containerization and on the presence of competition.

(3) Shippers appear to gain from faster vessel transit time and from savings in packaging of cargoes, which saves on stowage and minimizes damage. These savings have to be offset by the extra cost shippers may have to incur to containerize cargoes. Some of these extra costs are caused by institutional constraints.

/(4)

(4) In general, the benefit of containerization has been uneven to all shippers. The large shippers and most shippers in the competitive routes have gained. Containerization has also benefited exporters of new industrial products more than those selling processed exports. Some aspects of this differential impact may have to be kept under review. Shippers as a whole need to have a sound understanding of the container system to safeguard their position.

B. Impact of containerization on shipping in selected developing countries of the ESCAP region (E/ESCAP/STC.6/7)

Obviously, one of the current problems posed to shipowners by containerization is the intense competition among carriers, which has prevailed in all the areas surveyed and in other parts of the region and the world as well. The play of market forces could lead to the elimination of the weaker lines. The carriers concerned would tend to get together and exert their utmost efforts to protect their collective interest and put the situation in order. Consideration needs to be given to various means of rationalizing shipping services in order to relieve the serious over-tonnaging and avoid its recurrence and also to realize savings and efficiency in energy utilization by ships. Joint shipping services or consortia, which are resorted to vis-a-vis containerization even by the long-established lines of developed maritime countries, may be other means which will enable the lines concerned to survive in a very tight market situation.

It hardly needs elaboration to see that the size and capacity of a nation's fleet depend not only on the conditions of the trade but also on the conditions of its home ports. In many countries, the poor conditions of the ports dissuades the national shipping operators from acquiring modern types of ship for service to those ports. It is encouraging, however, to note that the countries surveyed have plans to expand or construct new terminals. Early decision and action on the port plans would enable national lines, in turn, to attune their own plans and projects as to time and scale.

Improvements in the hardware side of infrastructure such as roads, railways and bridges could take time to effect considering the present resources available to the countries. Efforts should be exerted to expedite these improvements as they will go a long way to enabling containerization to reach the true door-to-door stage in the area. However, the software side can be taken up without delay and its improvement is no less important.

/Labour

Labour practices in some ports and customs procedures are matters which require immediate attention by those concerned as existing practices in these areas could present major obstacles to the more effective use of containerization.

C. Impact of containerization on ports in selected developing countries of the ESCAP region (E/ESCAP/STC.6/8)

The objective of this study has been to identify areas where problems can be resolved in the short and medium term. However, due to the complexity of interaction, it has been impossible to exclude comment related to the long-term situation. It is clear that a number of areas that require further analysis and attention include:

(a) The establishment of an appropriate cost structure system on which port prices might be based;

(b) Upgrading and redeployment of management and labour;

(c) Streamlining and reducing the related cost of institutional procedures to facilitate inland movement of containers;

(d) The possibility of instituting multi-modal transport documents and the establishment of multi-modal transport operations;

(e) Participation of private companies in the operation and investment in terminal facilities, particularly at inland sites;

(f) Direct of indirect (through financing institutions) financial and technical assistance from developed maritime countries having a major impact on the movement of containerized cargo from and to the developing countries of the ESCAP region.

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